

What is claimed is:

1. A surge protection apparatus connected between an electrical power line source and a load, comprising:

a voltage input coupled to the electrical power line;

an inductor coupled between the voltage input and the load; and

a protective barrier interposed between the inductor and the load, the protective

barrier configured to physically isolate the inductor from the load.

2. A surge protection apparatus connected between an electrical power line and a load, comprising:

a voltage input coupled to the electrical power line;

a polymeric positive temperature coefficient device (PPTC) coupled between the voltage input and the load; and

a protective barrier interposed between the PPTC and the load, the protective barrier configured to physically isolate the PPTC from the load.

3. An apparatus as claimed in claim 1, further comprising a polymeric positive temperature coefficient device (PPTC) connected in series with the inductor between the voltage source and the load, wherein the protective barrier is configured to physically isolate both the inductor and the PPTC from the load.

4. A surge protection apparatus connected between an electrical power line and a load, comprising:

a voltage input coupled to the electrical power line;

an inductor, a resistor and a polymeric positive temperature coefficient device (PPTC) coupled in series between the voltage input and the load.

5. The surge protection apparatus of claim 4, further comprising a protective barrier interposed between the load and the inductor, the resistor and the PPTC, the protective barrier configured to physically isolate the inductor, the resistor and the PPTC from the load.

6. An electricity meter for measuring electrical power consumed by a load, the electricity meter comprising:

a voltage input coupled to an electrical power line;

a current input coupled to obtain current measurement information from the electrical power line;

a measurement device operably connected to receive measurement signals from the voltage input and the current input, the measurement device operable to generate electrical power consumption measurements from the measurement signals;

a surge protection apparatus, the surge protection apparatus including at least one breakdown element and a protective barrier, the at least one breakdown element coupled between the voltage input and the measurement device, the protective barrier configured to physically isolate the at least one breakdown element from the measurement device.

7. The electricity meter of claim 6 wherein the at least one breakdown element comprises an inductor.

8. The electricity meter of claim 6 wherein the at least one breakdown element comprises a polymeric positive temperature coefficient device (PPTC).

9. The electricity meter of claim 8 wherein the at least one breakdown element further comprises an inductor.

10. The electricity meter of claim 6, further comprising:  
a meter resistor having an input and an output, the input disposed to be connected in series between the at least one breakdown device and the measurement circuit; and  
a metal oxide varistor (MOV) connected at a first end to the output of the meter resistor and at a second end to a ground.

11. The electricity meter of claim 7, further comprising:  
a meter resistor having an input and an output, the input disposed to be connected in series between the inductor and the measurement circuit; and  
a metal oxide varistor (MOV) connected at a first end to the output of the meter resistor and at a second end to a ground.

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- a meter resistor having an input and an output, the input disposed between the PPTC and the measurement circuit; and
- a metal oxide varistor (MOV) connected at a first end to the output of the meter resistor and at a second end to a ground.
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- The electricity meter of claim 9, further comprising:
- a meter resistor having an input and an output, the input disposed between the at least one breakdown device and the measurement circuit; and
- a metal oxide varistor (MOV) connected at a first end to the output of the meter resistor and at a second end to a ground.
- The electricity meter of claim 6, wherein:
- the voltage input is operably coupled to a polyphase electrical power line;
- the current input coupled to obtain current measurement information from the polyphase electrical power line;

15. An electricity meter for measuring electrical power consumed by a load, the electricity meter comprising:

a voltage input coupled to an electrical power line;

a current input coupled to obtain current measurement information from the electrical power line;

a measurement device operably connected to receive measurement signals from the voltage input and the current input, the measurement device operable to generate electrical power consumption measurements from the measurement signals;

a surge protection circuit coupled between the voltage input and the measurement device, the surge protection circuit comprising an inductor and a polymeric positive temperature coefficient device (PPTC) connected in series.

16. The electricity meter of claim 15, wherein the surge protection circuit further comprises a resistor coupled in series with the inductor and the PPTC.

17. The electricity meter of claim 16, further comprising a protective barrier, the protective barrier configured to physically isolate the surge protection circuit from the measurement device.

18. The electricity meter of claim 15, further comprising:

a meter resistor having an input and an output, the input disposed to be connected in series between the surge protection circuit and the measurement circuit; and

a metal oxide varistor (MOV) connected at a first end to the output of the meter resistor and at a second end to a ground.

19. The electricity meter of claim 16, further comprising:

a meter resistor having an input and an output, the input disposed to be connected in series between the surge protection circuit and the measurement circuit; and

a metal oxide varistor (MOV) connected at a first end to the output of the meter resistor and at a second end to a ground.

20. The electricity meter of claim 15, wherein:

the voltage input is operably coupled to a polyphase electrical power line;

the current input coupled to obtain current measurement information from the polyphase electrical power line;

21. A method for protecting an electrical load connected to an electrical distribution system, the distribution system at least one voltage-carrying conductor and a neutral conductor, the method comprising:

determining a transient condition and a threshold power at which said load is subject to an arcing condition, for a predetermined voltage;

selecting, based on said determining, at least one inductor having a transient response that prevents an event of a short duration voltage spike from causing said arcing condition at said load,

selecting at least one polymeric positive temperature coefficient device (PPTC) having a maximum current threshold that prevents an event of an excessive overvoltage from causing said arcing condition at said load; and

electrically coupling the at least one inductor and at least one PPTC in series respectively with said at least one conductor, so that each said inductor and each said PPTC is disposed between the respective conductor and said electrical load; and

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22. A method as claimed in claim 21, further comprising:

surrounding each of said inductors and each of said PPTCs with a protective barrier that isolates said each inductor and each PPTC from the load.

23. A method as claimed in claim 21, further comprising:

selecting at least one resistor having a minimum resistance for limiting a surge current and having a maximum power capacity; and

electrically coupling said at least one resistor in series respectively with said at least one conductor, so that each said resistor is disposed in series with a respective one of said inductors and a respective one of said PPTCs, between the respective conductor and said electrical load;

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